**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_**

**Boston Cooler Lab**

**I. Background Information: Factors Affecting Solubility**

Solubility is defined as the ability of a substance to dissolve in another substance. Solutions are mixtures containing a solute (substance being dissolved in solvent) and a solvent (material that dissolves the other substance-solute). Solutes and solvents can be solids, liquids, and gases. The most common solutions, however, have liquid solvents. You can probably think of many solutions that you encounter regularly, such as apple juice, soda, etc.

There are several factors that affect the solubility of a solute in a particular solvent. In this experiment you will examine the effects of temperature, size of solute particles, and shaking (stirring) on solubility. Some results may surprise you. As you examine the factors, you will be looking at solutions with soda as the solvent and ice-cream as the solute.

**II. Objectives**

1. Determine the effect of temperature on the solubility of ice cream in soda.

2. Determine the effect of the solute size on the solubility of ice cream in soda.

3. Determine the effect of shaking (or stirring) on the solubility of ice cream in soda.

**III. Materials**

Apparatus Reagents

Cups Ice Cream

Spoons Soda

Measuring cup

Stop watch

**IV. Procedure**

Part 1

1. Obtain 1 scoop of solute (ice cream)

2. Have one person obtain 50mL (1/2 cup) of warm solvent (soda) and the other obtain the same amount of cold solvent (soda).

3. Draw a before sketch of the solution.

4. Allow the solution to set 5 minutes with the person with the warm solvent holding it.

5. Draw and after photo of the solution.

6. Dispose of the solutions, clean, and rinse the cup.

Part 2

1. Obtain 3 tablespoons samples of solute in each of two particles sizes (small and large chunks).

2. In each of the 2 cups, add 50mL (1/2 cup) of solvent.

3. Draw a before photo of the solution.

4. Allow the solution to set 5 minutes.

5. Draw an after photo of the solution.

6. Dispose of the solutions, clean, and rinse the cup.

Part 3

1. Obtain 1 tablespoon of solute and place it in each cup.

2. In each of the two cups, place 50mL (1/2 cup) of solvent.

3. Draw a before photo of the solution.

4. Allow the solution to set 5 minutes with one person stirring their solution.

5. Draw an after photo of the solution.

6. Dispose of the solutions, clean, ad rinse the cup.

**V. Pre-lab Questions**

1. In a solution of ice cream and soda, what is the: a. solute \_\_\_\_\_\_\_\_\_\_

b. solvent \_\_\_\_\_\_\_\_\_\_

2. Give 5 examples of solutions that you use on a regular basis.

3. Why is it important to keep all conditions of an experiment identical with the exception of the factor being studied?

4. Give two examples of gases dissolved in liquids.

5. What are three factors that you will be examining in this experiment?

**Data**

**Part 1**

|  |  |  |
| --- | --- | --- |
|  | Before | After |
| Cold Solvent |  |  |
| Warm Solvent |  |  |

**Part 2**

|  |  |  |
| --- | --- | --- |
|  | Before | After |
| Small Chunks |  |  |
| Large Chunks |  |  |

**Part 3**

|  |  |  |
| --- | --- | --- |
|  | Before | After |
| Stirred |  |  |
| Not Stirred |  |  |

**Conclusion**

1. Based on the results of this experiment, complete the following statements:

a. Most solids dissolve better in liquids when?

b. Gases dissolve better in liquids when?

2. Explain the effects of the following on solubility:

a. the effect of temperature on the solubility of solid solutes

b. the effect of size of particles on the solubility of solid solutes

c. the effect of stirring on the solubility of solid solutes.

3. Explain the differences between the dissolving of solid and gases in terms of kinetic motion.

**Synthesis**

1. What effect will pressure have on the solubility of solids in liquids? Why?